

CLAIMS:

1. An electronic magnetic-based indicator tool comprising:
a housing having an electronic display;
an electronic compass module for determining an orientation of sensed magnetic fields; and
a processing module for receiving magnetic data values from the electronic compass module;
wherein the processing module
receives background magnetic field data;
receives target magnetic field data when the indicator tool is located above an implanted flow control device having a magnetic indicator device coupled to a valve; and
determines a setting for the valve within the implanted flow control device using the background magnetic field data and target magnetic field data.
2. The electronic magnetic-based indicator tool according to claim 1, wherein the processing module further subtracts the background magnetic field data from the target magnetic data to determine the setting of the valve on the implantable flow control device.
3. The electronic magnetic-based indicator tool according to claim 1, wherein the processing module generates a display image corresponding to the orientation of the implantable flow control device and outputs the display image on the electronic display.
4. The electronic magnetic-based indicator tool according to claim 1, wherein the indicator tool further comprises a mechanical key device about its housing for orientating the indicator tool into a desired position relative to a locator tool placed in a desired orientation relative to the implanted flow control device.
5. The electronic magnetic-based indicator tool according to claim 1, wherein the indicator tool corresponds to a handheld device.

6. The electronic magnetic-based indicator tool according to claim 5, wherein the handheld device includes a removable battery.
7. The electronic magnetic-based indicator tool according to claim 3, wherein the electronic display is a liquid crystal display device.
8. An electronic magnetic-based indicator tool comprising:
 - a housing having an electric connection to a locator tool;
 - an electronic compass module for determining an orientation of sensed magnetic fields; and
 - a locator tool interface module for communicating sensed magnetic field data to a processing module in the locator tool for receiving magnetic data values from the electronic compass module;wherein the processing module
 - receives background magnetic field data;
 - receives target magnetic field data when the indicator tool is located above an implanted flow control device having a magnetic indicator device coupled to a valve; and
 - determines a setting for the valve within the implanted flow control device using the background magnetic field data and target magnetic field data.
9. The electronic magnetic-based indicator tool according to claim 8, wherein the processing module further subtracts the background magnetic field data from the target magnetic data to determine the setting of the valve on the implantable flow control device.
10. The electronic magnetic-based indicator tool according to claim 8, wherein the indicator tool further comprises a mechanical key device about its housing for orientating the indicator tool into a desired position relative to a locator tool placed in a desired orientation relative to the implanted flow control device.
11. The electronic magnetic-based indicator tool according to claim 8, wherein the indicator tool corresponds to a handheld device.

12. The electronic magnetic-based indicator tool according to claim 11, wherein the handheld device includes a removable battery.
13. An electronic magnetic-based indicator tool comprising:
a housing having an electric connection to a locator tool;
a target compass module for determining an orientation of sensed magnetic fields;
and
a locator tool interface module for communicating sensed magnetic field data to a processing module in the locator tool for receiving magnetic data values from the electronic compass module;
wherein the processing module
receives background magnetic field data from a background compass module within the locator tool;
receives target magnetic field data from the target compass module when the indicator tool is located above an implanted flow control device having a magnetic indicator device coupled to a valve; and
determines a setting for the valve within the implanted flow control device using the background magnetic field data and target magnetic field data.
14. The electronic magnetic-based indicator tool according to claim 13, wherein the processing module further subtracts the background magnetic field data from the target magnetic field data to determine the setting of the valve on the implantable flow control device.
15. The electronic magnetic-based indicator tool according to claim 13, wherein the indicator tool further comprises a mechanical key device about its housing for orientating the indicator tool into a desired position relative to a locator tool placed in a desired orientation relative to the implanted flow control device.

16. The electronic magnetic-based indicator tool according to claim 13, wherein the indicator tool corresponds to a handheld device.

17. The electronic magnetic-based indicator tool according to claim 16, wherein the handheld device includes a removable battery.

18. A system comprising:

an implantable flow control device comprising a first magnet to indicate a current valve setting;

a locator tool for determining an orientation with the implantable flow control device, the locator tool comprises a background compass module and a processing module;

an electronic magnetic-based indicator tool comprising a target compass module; and

an adjustment tool for modifying the orientation of the valve in the implantable flow control device, the adjustment tool comprises a magnetic adjustment component for magnetically coupling to the magnetic indicator device of the flow control device;

wherein the processing module:

receives background magnetic field data from the background compass module;

receives target magnetic field data from the target compass module when the indicator tool is located above an implanted flow control device having a first magnet coupled to a valve; and

determines a setting for the valve within the implanted flow control device using the background magnetic field data and target magnetic field data.

19. The system according to claim 18, wherein the processing module further subtracts the background magnetic field data from the target magnetic data to determine the setting of the valve on the implantable flow control device.

20. The system according to claim 18, wherein the indicator tool further comprises a mechanical key device about its housing for orientating the indicator tool into a desired position relative to a locator tool placed in a desired orientation relative to the implanted flow control device.

21. The system according to claim 18, wherein the indicator tool corresponds to a handheld device.
22. The system according to claim 21, wherein the handheld device includes a removable battery.
23. A system comprising:
an implantable flow control device comprising a first magnet to indicate a current valve setting;
a locator tool for determining an orientation with the implantable flow control device, the locator tool comprises a processing module;
an electronic magnetic-based indicator tool comprising a compass module; and
an adjustment tool for modifying the orientation of the valve in the implantable flow control device, the adjustment tool comprises a magnetic adjustment component for magnetically coupling to the first magnet of the flow control device;
wherein the processing module:
receives background magnetic field data from the compass module;
receives target magnetic field data from the compass module when the indicator tool is located above an implanted flow control device having first magnet coupled to a valve; and
determines a setting for the valve within the implanted flow control device using the background magnetic field data and target magnetic field data.
24. The system according to claim 23, wherein the processing module further subtracts the background magnetic field data from the target magnetic field data to determine the setting of the valve on the implantable flow control device.
25. The system according to claim 23, wherein the indicator tool further comprises a mechanical key device about its housing for orientating the indicator tool into a desired

position relative to a locator tool placed in a desired orientation relative to the implanted flow control device.

26. The system according to claim 23, wherein the indicator tool corresponds to a handheld device.

27. The system according to claim 26, wherein the handheld device includes a removable battery.

28. A system comprising:

- an implantable flow control device comprising a first magnet to indicate a current valve setting;

- a locator tool for determining an orientation with the implantable flow control device;

- an electronic magnetic-based indicator tool comprising a compass module and a processing module; and

- an adjustment tool for modifying the orientation of the valve in the implantable flow control device, the adjustment tool comprises a magnetic adjustment component for magnetically coupling to the first magnet of the flow control device;

- wherein the processing module:

- receives background magnetic field data from the compass module;

- receives target magnetic field data from the compass module when the indicator tool is located above an implanted flow control device having a first magnet coupled to a valve; and

- determines a setting for the valve within the implanted flow control device using the background magnetic field data and target magnetic field data.

29. The system according to claim 28, wherein the processing module further subtracts the background magnetic field data from the target magnetic data to determine the setting of the valve on the implantable flow control device.

30. The system according to claim 28, wherein the indicator tool further comprises a mechanical key device about its housing for orientating the indicator tool into a desired position relative to a locator tool placed in a desired orientation relative to the implanted flow control device.

31. The system according to claim 28, wherein the indicator tool corresponds to a handheld device.

32. The system according to claim 31, wherein the handheld device includes a removable battery.

33. A method comprising:

placing an electronic magnetic-based indicator tool adjacent to an implantable medical device, the implantable medical device having a magnetic indicator device coupled to a valve used to control operation of the medical device;

measuring a target magnetic field observed by a target compass module within the indicator tool ;

measuring an environmental magnetic field observed by a background compass module;

determining an orientation of the magnetic indicator device relative to a known position of the implantable medical device using the target magnetic field and the environmental magnetic field; and

indicating a device setting of the implantable medical device.

34. The method according to claim 33, wherein the target compass module and the background compass module are located distance apart sufficient to permit the background compass module to only detect ambient magnetic fields when the target compass module is located near the implanted flow control device.

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35. The method according to claim 33, wherein the background compass module is located within the locator tool.
36. The method according to claim 33, wherein the background compass module and the target compass module correspond to a single compass module within the indicator tool.